UNITED NATIONS

GENERAL ASSEMBLY

Distr:
LIMITED

A/CN.9/WG.IV/WP.53
16 December 1991

ORIGINAL: ENGLISH

UNITED NATIONS COMMISSION ON
INTERNATIONAL TRADE LAW
Working Group on
International Payments
Twenty-fourth session
Vienna, 27 January - 7 February 1992

ELECTRONIC DATA INTERCHANGE

Possible issues to be included in the programme of future work on the legal aspects of EDI

Note by the Secretariat

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INTRODUCTION

1. At its twenty-first session (1988), the Commission considered a proposal to examine the need to provide for the legal principles that would apply to the formation of international commercial contracts by electronic means. It was noted that there existed no refined legal structure for the important and rapidly growing field of formation of contracts by electronic means and that future work in that area could help to fill a legal vacuum and to reduce uncertainties and difficulties encountered in practice. The Commission requested the Secretariat to prepare a preliminary study on the topic. 1/

2. At its twenty-third session (1990), the Commission had before it a report entitled "Preliminary study of legal issues related to the formation of contracts by electronic means" (A/CN.9/333). The report summarized work that had been undertaken in the European Communities and in the United States of America on the requirement of a writing as well as other issues that had been identified as arising in the formation of contracts by electronic means. The efforts to overcome some of those problems by the use of model communication agreements were also discussed. The Commission requested the Secretariat to continue its examination of the legal issues related to the formation of contracts by electronic means and to prepare for the Commission at its twenty-fourth session a report that would analyse existing and proposed model communication agreements with a view to recommending whether a model agreement should be available for worldwide use and, if so, whether the Commission should undertake its preparation. The Commission expressed the wish that the report would give it the basis on which to decide what work might be undertaken by the Commission in the field. 2/

3. At its twenty-fourth session (1991), the Commission had before it the report it had requested, entitled "Electronic Data Interchange" (A/CN.9/350). The report described the current activities in the various organizations involved in the legal issues of electronic data interchange (EDI) and analysed the contents of a number of standard interchange agreements already developed or being currently developed. It also pointed out that such documents varied considerably according to the various needs of the different categories of users they were intended to serve and that the variety of contractual arrangements had sometimes been described as hindering the development of a satisfactory legal framework for the business use of EDI. It suggested that there was a need for a general framework that would identify the issues and provide a set of legal principles and basic legal rules governing communication through EDI. It concluded that such a basic framework could, to a certain extent, be created by contractual arrangements between parties to an EDI relationship and that the existing contractual frameworks that were proposed to the community of EDI users were often incomplete, mutually incompatible, and inappropriate for international use since they relied to a large extent upon the structures of local law.

1/ Official Records of the General Assembly, Forty-third Session, Supplement No. 17 (A/43/17), paras. 46 and 47, and ibid., Forty-fourth Session, Supplement No. 17 (A/44/17), para. 289.

2/ Ibid., Forty-fifth Session, Supplement No. 17 (A/45/17), paras. 38 to 40.

4. The report noted that, although many efforts were currently being undertaken by different technical bodies, standardization institutions and international organizations with a view to clarifying the issues of EDI, none of the organizations that were primarily concerned with worldwide unification and harmonization of legal rules had, as yet, started working on the subject of a communication agreement. With a view to achieving the harmonization of basic EDI rules for the promotion of EDI in international trade, the report suggested that the Commission might wish to consider the desirability of preparing a standard communication agreement for use in international trade. It pointed out that work by the Commission in this field would be of particular importance since it would involve participation of all legal systems, including those of developing countries that were already or would soon be confronted with the issues of EDI.

5. The report also suggested that possible future work for the Commission on the legal issues of EDI might concern the subject of the replacement of negotiable documents of title, and more particularly transport documents, by EDI messages. That was the area where the need for statutory provisions seemed to be developing most urgently with the increased use of EDI. The report suggested that the Secretariat might be requested to submit a report to a further session of the Commission on the desirability and feasibility of preparing such a text.

6. The Commission was agreed that the legal issues of EDI would become increasingly important as the use of EDI developed and that the Commission should undertake work in that field.

7. As regards the suggestions reflected above, there was wide support for the suggestion that the Commission should undertake the preparation of a general framework identifying the legal issues and providing a set of legal principles and basic legal rules governing communication through EDI. The Commission was agreed that, given the number of issues involved, the matter needed detailed consideration by a Working Group.

8. As regards the preparation of a standard communication agreement for worldwide use in international trade, support was given to the idea that such a project might be appropriate for the Commission. However, divergent views were expressed as to whether the preparation of such a standard communication agreement should be undertaken as a priority item. Under one view, work on a standard agreement should be undertaken immediately for the reasons expressed in the report, namely that no such document existed or seemed to be prepared by any of the organizations that were primarily concerned with worldwide unification and harmonization of legal rules and that the Commission would be a particularly good forum since it involved participation of all legal systems, including those of developing countries that were already or would soon be confronted with the issues of EDI. The prevailing view, however, was that it was premature to engage immediately in the preparation of a standard communication agreement and that it might be preferable, until the next session of the Commission, to monitor developments in other organizations, particularly the Commission of the European Communities and the Economic Commission for Europe. It was pointed out that high-speed electronic commerce required a new examination of basic contract issues such as offer and acceptance, and that consideration should be given to legal implications of the role of central data managers in international commercial law.

9. After deliberation, the Commission decided that a session of the Working Group on International Payments would be devoted to identifying the legal issues involved and to considering possible statutory provisions, and that the Working Group would report to the Commission at its next session on the desirability and feasibility of undertaking further work such as the preparation of a standard communication agreement. The Commission also took note of the suggestion by the Secretariat to prepare a uniform law on the replacement of negotiable documents of title, and more particularly transport documents, by EDI messages. 3/

10. The present note has been prepared to help the Working Group in structuring its deliberations. The note serves three purposes: the first is to review previous work undertaken by the Commission in relation to EDI and computer records and to suggest possible follow-up; the second is to provide the Working Group with an annotated tentative list of legal issues that might warrant future work by the Commission; the third is to consider possible legal instruments that might be prepared at an international level to facilitate the increased use of EDI in international trade.

I. PREVIOUS WORK AND POSSIBLE FOLLOW-UP

A. Recommendation on the legal value of computer records

11. The Commission, at its seventeenth session (1984), decided to place the subject of the legal implications of automatic data processing to the flow of international trade on its programme of work as a priority item. 4/ It did so after considering a report of the Secretary-General entitled "Legal aspects of automatic data processing" (A/CN.9/254), which identified several legal issues, relating to the legal value of computer records, the requirement of a writing, authentication, general conditions, liability and bills of lading. The decision of the Commission was made after taking note of a report of the Working Party on Facilitation of International Trade Procedures (hereinafter referred to as "WP. 4"), which is jointly sponsored by the Economic Commission for Europe and the United Nations Conference on Trade and Development. The report suggested that, since the legal problems arising in this field were essentially those of international trade law, the Commission as the core legal body in the field of international trade law appeared to be the appropriate central forum to undertake and co-ordinate the necessary action. 5/

12. At its eighteenth session (1985), the Commission had before it a report by the Secretariat entitled "Legal value of computer records" (A/CN.9/265). That report came to the conclusion that, on a global level, there were fewer problems in the use of data stored in computers as evidence

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3/ Ibid., Forty-sixth Session, Supplement No. 17 (A/46/17), paras. 311 to 317.

4 Ibid., Thirty-ninth Session, Supplement No. 17 (A/39/17), para. 136.

5/ "Legal aspects of automatic trade data interchange" (TRADE/WP.4/R.185/Rev.1). The report submitted to the Working Party is reproduced in A/CN.9/238, annex.

in litigation than might have been expected. It noted that a more serious legal obstacle to the use of computers and computer-to-computer telecommunications in international trade arose out of requirements that documents had to be signed or be in paper form. After discussion of the report, the Commission adopted the following recommendation:

"The United Nations Commission on International Trade Law,

"Noting that the use of automatic data processing (ADP) is about to become firmly established throughout the world in many phases of domestic and international trade as well as in administrative services,

"Noting also that legal rules based upon pre-ADP paper-based means of documenting international trade may create an obstacle to such use of ADP in that they lead to legal insecurity or impede the efficient use of ADP where its use is otherwise justified,

"Noting further with appreciation the efforts of the Council of Europe, the Customs Co-operation Council and the United Nations Economic Commission for Europe to overcome obstacles to the use of ADP in international trade arising out of these legal rules,

"Considering at the same time that there is no need for a unification of the rules of evidence regarding the use of computer records in international trade, in view of the experience showing that substantial differences in the rules of evidence as they apply to the paper-based system of documentation have caused so far no noticeable harm to the development of international trade,

"Considering also that the developments in the use of ADP are creating a desirability in a number of legal systems for an adaptation of existing legal rules to these developments, having due regard, however, to the need to encourage the employment of such ADP means that would provide the same or greater reliability as paper-based documentation,

1. Recommends to Governments:

(a) to review the legal rules affecting the use of computer records as evidence in litigation in order to eliminate unnecessary obstacles to their admission, to be assured that the rules are consistent with developments in technology, and to provide appropriate means for a court to evaluate the credibility of the data contained in those records;

(b) to review legal requirements that certain trade transactions or trade related documents be in writing, whether the written form is a condition to the enforceability or to the validity of the transaction or document, with a view to permitting, where appropriate, the transaction or document to be recorded and transmitted in computer-readable form;

(c) to review legal requirements of a handwritten signature or other paper-based method of authentication on trade related documents with a view to permitting, where appropriate, the use of electronic means of authentication;

(d) to review legal requirements that documents for submission to governments be in writing and manually signed with a view to permitting, where appropriate, such documents to be submitted in computer-readable form to those administrative services which have acquired the necessary equipment and established the necessary procedures;

2. Recommends to international organizations elaborating legal texts related to trade to take account of the present Recommendation in adopting such texts and, where appropriate, to consider modifying existing legal texts in line with the present Recommendation." 6/

13. That recommendation (hereinafter referred to as the "1985 UNCITRAL Recommendation") was endorsed by the General Assembly in resolution 40/71, paragraph 5(b), of 11 December 1985 as follows:

"The General Assembly,

... Calls upon Governments and international organizations to take action, where appropriate, in conformity with the Commission's recommendation so as to ensure legal security in the context of the widest possible use of automated data processing in international trade; ...". 7/

14. Since 1985, a number of surveys of national legislation have been undertaken by international organizations by way of questionnaires, with a view to updating available information on the legal obstacles to the increased use of EDI. For example, such a survey was recently prepared by the Customs Co-operation Council (CCC) 8/. It may also be recalled that WP. 4 has decided to develop a questionnaire on the legal barriers to the use of EDI in different legal systems (see A/CN.9/350, para. 112). That questionnaire seems unlikely to be issued before 1993. The Secretariat intends to monitor that survey and to report its results to the Commission or the Working Group.

15. As was recently pointed out in several documents and meetings involving the international EDI community, e.g. in meetings of WP. 4, there is a general feeling that, in spite of the efforts made through the 1985 UNCITRAL Recommendation and the 1979 ECE Recommendation (see A/CN.9/333, para. 51), little progress has been made to achieve the removal of the mandatory requirements in national legislation regarding the use of paper and handwritten signatures. It has been suggested by the Norwegian Committee on Trade Procedures (NORPRO) in a letter to the Secretariat that "one reason for this could be that the 1985 UNCITRAL Recommendation advises on the need for

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6/ Official Records of the General Assembly, Fortieth Session, Supplement No. 17 (A/40/17), para. 360.

7/ Resolution 40/71 was reproduced in United Nations Commission on International Law Yearbook, 1985, vol. XVI, Part One, D. (United Nations publication, Sales No. E.87.V.4).

8/ See Customs Co-operation Council, document No. 36.548 E (Brussels, 19 March 1991).

legal update, but does not give any indication of how it could be done". In this vein, the Working Group may wish to consider what follow-up action to the 1985 UNCITRAL Recommendation the Commission could usefully take so as to enhance the needed modernization of legislation.

B. Coordination of work

16. At its nineteenth session (1986), the Commission had before it a report of the Secretary-General describing the work of international organizations active in the field of automatic data processing (A/CN.9/279). The Commission approved the suggestion contained in the report that it might undertake leadership in the co-ordination of activities in this field by requesting the Secretariat to organize a meeting in late 1986 or early 1987 to which all interested intergovernmental and non-governmental international organizations might be invited. 9/

17. The meeting was held at Vienna on 12-13 March 1987. The following organizations attended: Central Office for International Rail Transport; Council of Europe; Economic Commission for Europe; Commission of the European Communities; Hague Conference on Private International Law; International Maritime Organization; Organization for Economic Co-operation and Development; United Nations Commission on International Trade Law.

18. It was recognized at that meeting that co-operation was both important and, in some respects, difficult. It was important because the introduction of automatic data processing in international trade, through the use of computers and their inter-connection by telecommunications, created legal problems that could seldom be solved by any one organization. Therefore, co-operation was necessary, not only to ensure that organizations were not working in conflict with one another, but because certain problems can be solved only through efforts taken from several points of view. It was, however, acknowledged that co-operation was sometimes difficult to achieve because of the differences between the organizations as reflected in their fundamental concerns, approach to legal problems, membership and working methods (see A/CN.9/292, paras. 2 to 8).

19. At its further sessions, the Commission was informed of the progress made in the work of other interested organizations (see A/CN.9/292; A/CN.9/333; A/CN.9/350). It is submitted that while cooperation regarding the legal issues of EDI has become increasingly difficult, it has also become more necessary, given the number of organizations involved, their often technical nature and the number of projects currently undertaken or being considered in connection with the legal implications of EDI. The Working Group may wish to reaffirm the coordinating role of UNCITRAL and to discuss whether it would be appropriate to recommend that a new meeting be convened to which all interested intergovernmental and non-governmental organizations might be invited, as was the case in 1987.

9/ Official Records of the General Assembly, Forty-first Session, Supplement No. 17 (A/41/17), para. 261.

C. Participation in the drafting of the UNCID Rules

20. The first effort accomplished by the international EDI community to harmonize and unify EDI practices resulted in the adoption of the Uniform Rules of Conduct for Interchange of Trade Data by Teletransmission (UNCID) by the International Chamber of Commerce (ICC) in 1987 (ICC Publication No. 452, 1988). UNCID was prepared by a special joint committee of the ICC in which the following organizations were represented: the United Nations Economic Commission for Europe (ECE); the Customs Co-operation Council (CCC); the UNCTAD Special Programme on Trade Facilitation (FALPRO); the Organization for Economic Co-operation and Development (OECD); the International Organization for Standardization (ISO); the Commission of the EEC; the European Insurance Committee; the Organization for Data Exchange via Teletransmission in Europe (ODETTE) and the Secretariat of UNCITRAL.

21. Although the first draft of UNCID was based on the idea of creating a model communication agreement, it was found that, due to the differing requirements of various user groups, the creation of a model communication agreement was an impracticable objective at such an early stage of the development of EDI techniques. It was therefore decided to create a small set of non-mandatory rules on which EDI users and suppliers of network services would be able to base their communication agreements. UNCID was also incorporated into United Nations rules for Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT) as part of the United Nations Trade Data Interchange Directory. Although UNCID constituted a limited achievement, it also represented a major step in the development of a legal framework for EDI, both because it furnished a basis for preparing individual communication agreements and because it served as a first effort that could later be used to reach a higher level of refinement (see A/CN.9/333, paras. 82 to 86).

22. The Working Group may wish to consider reviewing the substance of the UNCID Rules and use the results of that examination as a basis for its further deliberations on the legal issues of EDI (see below, chapter III). It is also submitted that such a review of the UNCID Rules might help the Working Group in its consideration of possible statutory provisions and of the desirability and feasibility of undertaking further work such as the preparation of a standard communication agreement (see below, chapter IV, B and C). The text of the UNCID Rules and an introductory note prepared by ICC (ICC Publication No. 452) are reproduced in Annex.

23. The following issues are covered by UNCID: definitions; use of interchange standards; standard of care to be applied by the parties when communicating through EDI; identification and authentication of messages and transfers; acknowledgement of a transfer; confirmation of content of messages; protection of trade data; storage of data. In addition, the introductory note to UNCID outlines the following issues to be considered when drafting a communication agreement: liability; situation of third parties; insurance; time within which a receiver should process the data; secrecy or other rules regarding the substance of the data exchanged; rules of a professional nature; encryption and other security measures; rules on signature; applicable law and dispute resolution.

24. Most of the issues covered by UNCID and the introductory note are discussed below in chapter III. Of those issues addressed by UNCID or the introductory note but not addressed in this note, some are of a technical

nature or have legal implications mainly outside the area of trade law: use of interchange standards; protection and storage of data; insurance; secrecy or other rules regarding the substance of the data exchanged. Some other issues have legal implications mainly in the area of trade law and would need to be discussed in detail if the preparation of a legal instrument on EDI were to be undertaken: standard of care to be applied by the parties when communicating through EDI; time within which a receiver should process the data; implications of rules of a professional nature such as the rules of the Society for Worldwide Interbank Financial Telecommunication (SWIFT); applicable law and dispute resolution.

II. DEFINITION OF EDI

25. With a view to getting a clearer idea as to what the modern term "EDI" encompasses, the Working Group may wish to consider existing definitions of EDI. In recent years, the term "Electronic Data Interchange" or its acronym "EDI" has become widely used in practice to describe the use of computers for business applications. However, it must be noted that there currently exists no unified definition of EDI and that the use of the term in the legal field may create some confusion.

26. No statutory or case law definition of EDI has, as yet, come to the knowledge of the Secretariat. However, it may be noted that a number of definitions of EDI can be found in working documents from international organizations and are used as a basis for the work of these organizations. For example, the United Nations Trade Data Interchange Directory (UNTDID) published by the United Nations Economic Commission for Europe (TRADE/WP.4/R.721) contains the following definition:

> "Electronic Data Interchange: the computer-to-computer transmission of business data in a standard format".

27. Definitions of EDI are also contained in communication agreements, other contractual stipulations and commentaries thereto. Although they differ slightly as to their wording, most definitions of EDI contained in existing model interchange agreements seem to rely on a combination of two or more of the following elements: the transmission of trade data; between computers; operated by different trading partners; by reference to a standardized syntax or format; through the use of electronic means. Examples of such definitions of EDI in model communication agreements include the following: "the interchange of trade data effected by teletransmission" 10/; "the transmission of data structured according to agreed message standards, between information systems, by electronic means" 11/; "the transmission of structured data via electronic communication links between the parties" 12/. Wording to the same effect can

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10/ Article 2(b) of the "CMI Rules for Electronic Bills of Lading" adopted by the International Maritime Committee (CMI) in June 1990.

11/ Article 1 of the "TEDIS European Model EDI Agreement" prepared by the Commission of the European Communities (May 1991).

12/ Article 1.1. of the draft "Model Interchange Agreement" prepared by the Organization for Simplification of International Trade Procedures in South Africa (SITPROSA, March 1991).

be found in other model communication agreements 13/ and commentaries. For example, the commentary developed by the American Bar Association (ABA) reads as follows:

> "Electronic data interchange ("EDI") is the method by which business data may be communicated electrically between computers in standardized formats (such as purchase orders, invoices, shipping notices and remittance advices) in substitution for conventional paper documents. ...Technically stated, EDI is the transmission, in a standard syntax, of unambiguous information between computers of independent organizations." 14/

28. However, some differences may exist as to the extent to which commercial uses of computers should be covered by the term "EDI". For example, the preliminary Report entitled "DOCIMEL Rapport de base droit" (March 1991), published by the International Rail Transport Committee (CIT), contains the following indication:

> "It seems that [the term 'EDI'] strictly covers the interchange of data but not the processing of these data, which is independent from their actual transmission".

29. Another distinction is drawn in a report prepared for the Organization for Simplification of International Trade Procedures in South Africa (SITPROSA), which reads as follows:

> "Electronic Data Interchange is usually defined as the electronic exchange of machine processable, structured data, formatted to agreed standards and transmitted across telecommunications interfaces directly between different applications running on separate computers. Thus defined, it is clear that EDI does not include facsimile transmissions, electronic mail or other forms of free formatted text or images." 15/

30. Such distinctions are not necessarily adopted by legal writers; instead a broader definition of EDI has been suggested, such as the following:

13/ Article 1.f. of the "Standard Interchange Agreement" prepared by the Ministry of Communications of the Province of Quebec (Canada, 1990); article 0.a. of the model EDI interchange agreement prepared by the Centre International de Recherches et d'Etudes du Droit de l'Informatique et des Télécommunications (CIREDIT) (France, 1990).

14/ Introduction to "The Commercial Use of Electronic Data Interchange - A Report" (Chicago, Illinois, American Bar Association, 1990), p. 23. Also published in The Business Lawyer, vol. 45, No. S, June 1990, p. 1661.

15/ G.T.S. Eiselen, "Legal issues of the change to electronic data interchange. - Report of a preliminary investigation", document prepared for SITPROSA in 1989.

> "It is generally admitted that EDI only covers the communication of trade documents (such as purchase orders, invoices, customs declarations or other documents capable of being formatted by reference to international standards) between trading partners or to a public administration. [...] However, the increased use of new information technologies in modern economy makes it clear that the implications of EDI are broader and cannot be limited to certain relationships between trading partners and public authorities. Thus, one must consider as a component of an EDI relationship the use of such automatic processing devices as computer-aided design, for example in the automotive industry, or the use of statistical data banks in the insurance trade. ... Extremely varied relationships between professionals are to be considered when analysing the legal issues of EDI, despite the fact that those relationships do not involve standardized documents only." 16/

31. The two most recent studies prepared for the Commission on the subject (A/CN.9/333 and A/CN.9/350) make use of the term "EDI". It may be noted that in prior reports to the Commission and in the reports of the Commission the subject had been considered under the general heading of "automatic data processing" (ADP), which was the term generally used to describe the use of computers for business applications (see A/CN.9/333, para. 7). The change in terminology from ADP to EDI was not intended to introduce a distinction between the transmission and the processing of data or to exclude consideration of the issues raised by the transmission of any form of free formatted text or image for commercial purposes. It may be noted, however, that communication of data through EDI inherently supposes a degree of standardization in the form of a predefined syntax used in common by all parties to the EDI relationship so that the data can be read and processed by the computers of both the sender and the recipient of the data.

32. References to the legal issues of EDI made in prior reports to the Commission and in the reports of the Commission were meant to cover the legal issues that may arise out of the use of new information technologies involving the interchange of data for commercial or regulatory purposes (to the exclusion of consumer transactions), thus producing legal effects such as the creation of rights and obligations traditionnally produced or evidenced by the interchange of paper-based documents. In that connection, the Working Group may wish to consider the emerging concept of "Open-EDI" recently developed by the International Organization for Standardization (ISO) within its Special Working Group on EDI. Open-EDI is defined as follows:

> "Electronic data interchange among autonomous parties using public and non-proprietary standards aiming towards global interoperability over time, business sectors, information technology systems and data types".

16/ J. Huet, "Aspects juridiques de l'EDI, Echange de Données Informatisées (Electronic Data Interchange)" (Paris, Recueil Dalloz, Chron. p. 182-183, 1991). The author also suggests to broaden the definition of EDI so as to extend it to transmissions involving third parties such as end consumers.

That definition of Open-EDI relies on the following definition of EDI:

> "The automated exchange of predefined and structured data for some 'business' purpose among information systems of two or more parties their number being determined by the 'business operation' or equivalent concerned." 17/

33. The Working Group may wish to consider whether new terminology might be adopted that would reflect more accurately the scope of the issues currently considered under the term "EDI". It is submitted that wording mentioning "paperless trade" might be more appropriate, although the current practice of EDI seems unlikely to result in complete disappearance of paper-based documents.

III. POSSIBLE ISSUES OF FUTURE WORK

34. At the outset, the Secretariat wishes to emphasize that the considerations and suggestions set forth in this annotated list of possible issues are of a very tentative nature, due to the early stage of the deliberations. The annotated list summarizes and updates some of the information contained in previous documents with a view to assisting the Working Group in its review of previous work and, in particular, in its consideration of appropriate recommendations to the Commission as to the scope and contents of possible future work on the legal aspects of EDI.

35. Most legal issues presented in this chapter arise from statutory obstacles to the increased use of EDI in international trade and most of these issues are dealt with in communication agreements with a view to overcoming those statutory obstacles by purely contractual means.

36. However, it must be pointed out that not all issues may be dealt with in a satisfactory manner by contractual means. The development of the contractual approach, while helping to better understand the legal issues of EDI, mainly reflects a conception under which the use of EDI for commercial purposes is envisaged essentially, if not exclusively, in the context of closed networks established between individual users or by third-party service providers.

A. The requirement of a writing

1. General remarks

37. Legal rules in many States require certain transactions to be concluded or evidenced in writing. In the report that led to the adoption of the 1985 UNCITRAL Recommendation, the requirement of a writing in national

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17/ See J.V.Th. Knoppers, "Results of the work of the International Organization for Standardization (ISO) [& International Electrotechnical Commission (IEC)] on the 'Open-EDI conceptual model' and its importance for EDI developments", text of a presentation made at the World EDI Forum (Brussels, September 1991).

statutes as well as in certain international conventions on international trade law was identified as one major obstacle to the increased use of EDI (A/CN.9/265, paras. 59 to 72).

38. In general, it can be noted that a requirement that contracts be in writing under national legislation may have one of three consequences. In one situation, a writing is required as a condition of validity and, consequently, the non-existence of a writing entails the nullity of the legal act. In a second situation, a writing is required by law for evidentiary purposes. A contract of that kind can be validly concluded by the parties without a writing being required but the enforceability of the contract is limited by a general rule that requires the existence and contents of the contract to be evidenced by a writing in case of litigation. Some exceptions to that rule may exist (see below, para. 40). In a third situation, a writing is needed to produce some specific legal result beyond that of merely evidencing the contract. This is for example the case with air cargo carriage contract under the 1929 Warsaw Convention. 18/ Under this text, the issuance of an air waybill is not required as a condition for entering into a contract for the carriage of goods, but it is required to give the carrier the benefit of the provisions of the Convention providing for limitation of liability of the carrier (see A/CN.9/333, para. 11).

39. Among the reasons for the requirement of a writing are a desire to reduce disputes by ensuring that there would be tangible evidence of the existence and contents of the contract; to help the parties be aware of the consequences of their entering into a contract; to permit third party reliance on the document; and to facilitate subsequent audit for accounting, tax or regulatory purposes.

40. In those countries where a general rule of civil law (as distinguished from commercial law) is that economic transactions can be proven in litigation only by a writing, there are many exceptions to the rule. For example, a writing is generally not required for transactions of a small amount, or a written document that is not the contract itself but contains some material relating to the substance of the contract may generally be admitted as evidence. Yet another exception may exist where it is impossible for a party to obtain written evidence of the contract. 19/ Moreover, the general requirement of a writing is generally considered as an evidentiary requirement of civil law and not of commercial law, where evidence of contracts may be presented to a court in any form.

18/ Convention for the Unification of Certain Rules Relating to International Carriage by Air, Warsaw, 12 October 1929, articles 5 to 9.

19/ For an example of such a rule and some exceptions, see articles 1341, 1347 and 1348 of the French Civil Code.

2. Statutory definitions of "writing"

41. What constitutes a "writing" is itself a matter of debate. The word has been defined in some countries, though normally by reference to the mode of imposition on the medium rather than by reference to the nature of the medium itself. For example, under the Interpretation Act 1978 of the United Kingdom, "writing" includes typing, printing, lithography, photography and other modes of representing or reproducing words in a visible form, whilst section 1-201(46) of the Uniform Commercial Code of the United States of America provides that "written" or "writing" includes printing, typewriting or any other intentional reduction to tangible form. It is probably the case that whenever a statute uses the word "writing" without a definition, the legislator originally expected the writing to be on a traditional piece of paper or some other physical medium permitting the words to be read directly by humans.

42. The definition of a writing has often been extended to include a telegram or telex, as in article 13 of the United Nations Convention on Contracts for the International Sale of Goods. In article 7(2) of the UNCITRAL Model Law on International Commercial Arbitration, the definition of a writing has been further extended to encompass "telex, telegrams, or other means of telecommunication which provide a record of the agreement". Article 4(3) of the Convention on the Liability of Operators of Transport Terminals in International Trade provides that "a document ... may be issued in any form which preserves a record of the information contained therein". A similar idea is expressed in the definition of "notice in writing" in article 1(4)(b) of the 1988 Convention on International Factoring prepared by the International Institute for the Unification of Private Law (UNIDROIT), in which a writing "includes, but is not limited to, telegram, telex and any other telecommunication capable of being reproduced in tangible form".

43. A general study of legislation was conducted by the Commission of the European Communities in the context of the TEDIS (Trade Electronic Data Interchange Systems) programme, 20/ which has as one of its purposes the development of an appropriate legal framework for the increased use of EDI. The purpose of the study, in line with the 1985 UNCITRAL Recommendation, was to identify the legal obstacles to the increased use of EDI in the twelve member States of the European Communities. The results of that study are summarized in A/CN.9/333, paras. 15 to 41. A similar analysis is currently being carried out concerning the national laws of the member States of the European Free Trade Association (EFTA) in the context of the TEDIS programme.

3. Contractual definitions of "writing"

44. Communication agreements often contain stipulations aimed at overcoming possible difficulties that might arise concerning the validity and enforceability of legal acts (particularly contracts) due to the fact that they are formed through an exchange of EDI messages instead of the usual written documents. Several communication agreements examined by the Secretariat adopt one or both of the two following approaches to establish the

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20/ TEDIS - The legal position of the Member States with respect to Electronic Data Interchange, (Brussels, Commission of the European Communities, 1989).

legally binding value of EDI messages. Under the first approach, EDI messages are defined as written documents by mutual agreement of the parties (see A/CN.9/350, paras. 68 to 76). The second approach relies upon a mutual renunciation by the parties of any rights or claims to contest the validity or enforceability of an EDI transaction under possible provisions of locally applicable law relating to whether certain agreements should be in writing or manually signed to be binding upon the parties (see A/CN.9/350, paras. 77-78).

45. It may be noted that no contractual stipulation attempts to address those categories of contracts which, under certain legal systems, are required to be made in a specific form, generally a written document authenticated by a public authority (see A/CN.9/333, paras. 23 to 25).

B. Evidential value of EDI messages

1. Statutory and case law on admissibility of evidence

46. A general overview of statutory and case law on evidence, based on the replies given by States and international organizations to a questionnaire circulated by the Secretariat in 1984, is contained in A/CN.9/265, paras. 27 to 48. It indicates that there are three major variations on the general law of evidence which affect the evidential value of computer records. The variations are based on different legal traditions and practices in the fact-finding process in civil or commercial disputes.

47. In a number of legal systems the litigants are in principle allowed to submit to the court all information which is relevant to the dispute. If there is a question as to the accuracy of the information, the court must weigh the extent to which it can be relied upon. In these legal systems there is in principle no obstacle to the introduction of computer records as evidence in judicial or arbitral proceedings.

48. Another group of States establish an exhaustive list of acceptable evidence, which always includes written documents as one of the acceptable forms of evidence. In a few of those States computer records are not admissible as evidence in any court. In other States a computer record might be relied upon to furnish to the court a presumption as to the facts in the case. Moreover, in some of these States the restriction on the use of non-written evidence is found in the civil law governing non-commercial matters. In commercial matters, as well as in criminal trials, non-written evidence may be freely accepted. In those States a computer record may, therefore, be generally acceptable as evidence in all commercial matters.

49. In common law countries an oral and adversarial procedure is generally employed in litigation. As part of that dual tradition, a witness may testify only to what he or she knows personally so as to allow the opponent an opportunity to verify the statements by cross-examination. What he or she knows through a secondary source, e.g. another person, a book or a record of an event, is denominated "hearsay evidence", and, in principle, the tribunal cannot receive it as evidence.

50. Because of the difficulties which the hearsay evidence rule has caused, there are many exceptions to it. One of those exceptions is that a business record created in the ordinary course of commercial activity may be received as evidence even though there may be no individual who can testify

from personal knowledge and memory as to the particular record in question. In some common law countries a proper foundation must be laid for the introduction of the record by oral testimony that the record is of a normal nature. In others, the record is automatically accepted subject to challenge, in which case the party relying upon the record must show that it is of the proper kind. Some common law countries have accepted computer print-outs as falling within the business records exception to the hearsay-evidence rule.

51. A more recent study of legal rules on admissibility of evidence was carried out by the Commission of the European Communities in the context of the TEDIS programme (see above, para. 43). A summary of the conclusions reached by the TEDIS study is contained in A/CN.9/333, paras. 29 to 41.

52. The general conclusion of the TEDIS study was that, while there were no major obstacles to the development of EDI in civil law countries, and therefore no need for fundamental changes of the rules, the common law countries showed theoretical difficulties which made it necessary to adopt statutory law to meet the needs of EDI.

53. The conclusions of the TEDIS study also suggested that a number of obstacles remained as regards the requirement of a writing for accounting, tax or other regulatory purposes. It may be noted that in some States a reform of the law is being contemplated or implemented. This is, for example, the case in France where a recent statute modified the price control regulation under which invoices were to be delivered in written form. 21/ It may be expected that the project under consideration by WP. 4 to issue a new questionnaire might help in identifying such non-commercial obstacles to the increased use of EDI and any changes currently envisaged by national authorities.

2. Contractual rules on admissibility of evidence

54. In earlier days, controversies arose about the validity of privately agreed standards on admissibility of evidence in case of litigation. It now seems to be widely accepted that, under both common law and civil law systems, such private commercial agreements on admissibility of evidence are valid or, at least, not generally prohibited.

55. An overview of contractual provisions on admissibility of EDI messages as evidence is contained in A/CN.9/350, paras. 79 to 83.

C. Requirement of an original

1. Statutory rules

56. It has been a general rule of evidence that documents and other records had to be presented to a court in their original form so as to ensure that the data presented to the court was the same as the original data. However, in recent years the large savings which can be realized by storing microfilms or computer recordings of original paper documents and destroying

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21/ Loi de finances rectificative pour 1990 (No. 90-1169 du 29 décembre 1990), article 47, (Journal Officiel du 30 décembre 1990).

the originals has led many States to permit their use as evidence in place of the original. The issues of recording in computer form original paper documents and the question as to whether a computer print-out is to be considered as an original or as a copy of the computer record were discussed in the context of automatic data processing in A/CN.9/265, paras. 43 to 48.

57. The data as stored in a computer in electronic form cannot be read or interpreted by a human being. Therefore, it cannot be presented to a court unless it takes on a visual form, either on a print-out or on a visual display unit which the court can look at. According to the replies to the 1984 questionnaire, both means of presenting the data to the court are in use.

58. In a few States the question has arisen whether the print-out or the image on the visual display unit is the original computer record or is a copy of the record stored in computer-readable form. In most States this question either seems not to have arisen or the copy in human-readable form has been accepted on the ground that the original record was not available to the court. Where this question has threatened to preclude the acceptance of computer records as evidence, the rules of evidence sometimes tended to be amended to provide that a print-out could be considered to be an original record.

2. Contractual rules

59. Several model communication agreements set forth a contractual definition of an original document, following the "definition strategy" designed to do away with the requirement of a writing (see A/CN.9/350, para. 84). For example, the "Model Electronic Data Interchange Trading Partner Agreement" prepared by the American Bar Association (Article 3.3.2.) reads as follows:

> "('Signed Documents') shall be deemed for all purposes ... to constitute an 'original' when printed from electronic files or records established and maintained in the normal course of business." 22/

60. It may be noted that, at least in one civil law country, legal writers have expressed doubts as to whether a contractual definition of an "original" could validly deviate from a statutory provision listing a limited number of circumstances where a copy could be substituted for the normally required original with the same evidential value. 23/

D. Signature and other authentication

61. The issue of authentication of EDI messages has been addressed in previous reports prepared by the Secretariat (see A/CN.9/265, paras. 49 to 58; A/CN.9/333, paras. 50 to 59; and A/CN.9/350, paras. 86 to 89). The contents of those reports are summarized below, in paragraphs 62 to 66.

22/ See note 13.

23/ See A. Bensoussan in La gazette de la télématique et de la communication inter-entreprises, No. 11 (spring 1991), p. 20.

62. Authentication of a transaction document serves to indicate to the recipient and to third parties the source of the document and the intention of the authenticating party to issue it in its current form. In case of dispute, authentication provides evidence of those matters. Although an authentication required by law must be in the form prescribed, an authentication required by the parties can consist of any mark or procedure they agree upon as sufficient to identify themselves to one another. The most common form of authentication required by law is a manual signature.

63. The 1985 UNCITRAL Recommendation identified the legal requirements of a handwritten signature or other paper-based method of authentication as an obstacle to EDI. In line with that Recommendation and the 1979 ECE Recommendation (see A/CN.9/333, para. 51), which had expressed a similar concern, 24/ efforts are being made by the TEDIS group within the EEC to encourage the removal of mandatory requirements for handwritten signatures in national legislation. Similar efforts are being made in a number of other countries. In spite of such efforts, the most common form of authentication required by national laws remains a signature, which is usually understood to mean the manual writing by an individual of his name or initials. Legal systems increasingly permit the required signatures of some or all documents to be made by stamps, symbol, facsimile, perforation or by other mechanical or electronic means. This trend is most evident in the law governing transport of goods, where all the recent principal multilateral conventions that require a signature on the transport document permit that signature to be made in some way other than by manual signature (see A/CN.9/225, para. 47). Another example of such a definition of "signature" is to be found in Article 5 (k) of the United Nations Convention on International Bills of Exchange and International Promissory Notes, which reads as follows:

> "'Signature' means a handwritten signature, its facsimile or an equivalent authentication effected by any other means".

64. Although a manual signature, or its physical reproduction by mechanical or other means, is a familiar and inexpensive form of authentication and serves well for documents passing between parties that know each other, it is far from being the most efficient or the more secure method of authentication. The person relying on the document often has neither the names of the persons authorized to sign nor specimen signatures available for comparison. Even where a specimen of the authorized signature is available for comparison, only an expert may be able to detect a careful forgery. Where large numbers of documents are processed, signatures are often not even compared except for the most important transactions.

65. Various techniques have been developed to authenticate electronically transmitted documents. If the proper procedures are followed, some authentication techniques in current use for computer-to-computer messages are unlikely to be used successfully by unauthorized persons. Certain encryption techniques authenticate the source of a message, and also verify the integrity of the content of the message. Where such techniques are used, it seems

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24/ See TRADE/WP.4/INF.63; TD/B/FAL/INF.63.

reasonably certain that messages could not be deciphered by third parties in a commercially significant period of time. Previous reports prepared by the Secretariat contain a description of authentication techniques that may permit the verification of both the integrity of the message and the identity of the sender (see A/CN.9/333, paras. 48 and 54 to 56). When considering such authentication methods, it is submitted that attention needs to be paid to the costs involved, which may vary considerably according to the extent of computer processing needed to operate them. Such costs should be weighed against the presumed benefits in choosing the appropriate mode of authentication.

66. The extent to which such methods would receive legal recognition in States where signature is required by law for a particular document remains a matter of considerable uncertainty. Where the law has not been interpreted by the courts so as to consider an electronic form of authentication as a "signature", it is likely that this uncertainty will be overcome only by legislation. A question for consideration is how far such legislation, when specifically permitting authentication to be made by EDI, should require evidence of conformity with an applicable EDI protocol, at least as a condition of attracting a presumption of authenticity, the onus of proof being shifted to the party asserting the authenticity of the message in cases where the requirements of the protocol are not satisfied.

E. Formation of contracts

67. The issues of contract formation have been examined in previous reports (see A/CN.9/333, paras. 60 to 75 and A/CN.9/350, paras. 93 to 108). The contents of those reports are summarized below, in paragraphs 70 to 78.

68. In addition, it may be noted that a study entitled "La formation des contrats par échange de données informatisées" (hereinafter referred to as the TEDIS Study on the Formation of Contracts) has been recently prepared for the Commission of the European Communities within the TEDIS programme (see A/CN.9/333, para. 15). The French original of that study is expected to be released soon and an English language version is expected to be published before the end of 1992. The content of the TEDIS Study on the Formation of Contracts was communicated to the Secretariat by the Commission of the European Communities and used for the preparation of the present note.

69. Furthermore, it may be noted that a draft "Computer Code" prepared by the Norwegian Research Center for Computers and Law (Oslo) was presented in the context of a recent meeting of the ICC Working Party on "Legal and commercial aspects of EDI" (see paras. below). The introduction to that document 25/ states that "the draft Computer Code should be regarded as standard terms which may be deviated from by way of contract". However, it must be pointed out that the proposals set out in the draft "Computer Code" are "adapted to open network solutions, where the parties are not involved in a contractual relationship beforehand". That document was also used for the preparation of the present note.

25/ J. Freese, "EDI and National Legislation - Teresa (86)", International Chamber of Commerce, Document No. 460-10/Int.38 (September 1991).

1. Consent, offer and acceptance in an EDI context

70. As a matter of principle, the questions of offer and acceptance may be of particular importance in an EDI context since EDI creates new opportunities for the automation of the decision-making process (see A/CN.9/333, paras. 60 to 64). Such automation may increase the possibility that, due to the lack of a direct control by the owners of the machines, a message will be sent, and a contract will be formed, that does not reflect the actual intent of one or more parties at the time when the contract is formed. Automation also increases the possibility that, where a message is generated that does not reflect the sender's intent, the error will remain unperceived both by the sender and by the receiver until the mistaken contract has been acted upon. The consequences of such an error in the generation of a message might therefore be greater with EDI than with traditional means of communication.

71. The variety and complexity of national laws as regards the expression and validity of consent in the process of contract formation, as well as the possible revocability of an offer, illustrate the need for parties to conclude a communication agreement dealing with that issue prior to the establishment of an EDI relationship. An example of such a contractual clause is contained in A/CN.9/350, para. 93.

72. The issues of consent, offer and acceptance have been considered in the above stated TEDIS Study on the Formation of Contracts. That study concludes (see paras. 2.3.1.3. and 2.3.1.4.) that the use of a computer application in the contract formation process can raise difficulties as to the validity of contracts concluded by EDI, particularly where the contract formation process does not involve any direct human control and does not require any human confirmation. The TEDIS Study on the Formation of Contracts indicates that computers do not benefit from legal recognition as "persons" and thus cannot validly express consent to enter a legally binding relationship. However, it is also suggested that a person having (or deemed to have) final control over the operation of the computer application might be deemed to have consented to all messages dispatched by that application.

73. The TEDIS Study on the Formation of Contracts recommends that a uniform law should be prepared for the use of the member States of the European Communities. As one of the effects of such a uniform law, no defence against the validity of contracts formed through EDI could be based on the means of communication used in the contract formation process. The TEDIS Study on the Formation of Contracts also recommends that the requirements of the law of evidence should be harmonized and that the uniform law should eliminate the mandatory requirements regarding the use of written documents and manual signatures. It is also suggested that the uniform law should contain rules regarding the issues of communication. It is suggested that such rules could be modelled on the UNCID Rules, particularly as regards the identification of the sender of a message and as regards back-up messages. The TEDIS Study on the Formation of Contracts further recommends that the person having (or deemed to have) final control over the operation of the computer system should be held liable for all decisions taken by the computer application. It is suggested that all consequences of the operation of a computer system should be borne by the person who took the risk of operating such a system.

2. Time and place of formation

74. Parties to a contract have a practical interest in knowing when and where a contract is formed. The time when a contract is formed may determine

such issues as the moment when the offeror is no longer entitled to withdraw his offer and the offeree his acceptance; whether legislation that has come into force during the negotiations is applicable; the time of transfer of the title and the passage of the risk of loss or damage in the case of the sale of identified goods; the price, where it is to be determined by market price at the time of the formation of the contract. The place where the contract is formed may also be relevant for determining the competent court or the applicable law (see A/CN.9/333, para. 69).

75. When dealing with the issue of time and place of formation of contracts in the context of EDI relationships, the parties may in practice have an option between the dispatch rule and the reception rule, which are the two solutions most commonly found in legal systems (see A/CN.9/333, paras. 72 to 74). It may be recalled that according to the dispatch rule a contract is formed at the moment when the declaration of acceptance of an offer is sent by the offeree to the offeror. According to the reception rule, a contract is formed at the moment when the acceptance of the offeree is received by the offeror. That question is one of the important issues that may generally be settled in a communication agreement, in the absence of mandatory provisions of statutory law. As an example of such a contractual provision, article 9.2 of the "TEDIS European Model EDI Agreement" prepared by the Commission of the European Communities (May 1991) reads as follows:

> "Unless otherwise agreed, a contract made by EDI will be considered to be concluded at the time and the place where the EDI message constituting the acceptance of an offer is made available to the information system of the receiver." 26/ (Further examples of such contractual provisions are contained in A/CN.9/350, paras. 99-100.)

76. The TEDIS Study on the Formation of Contracts (see para. above) contains a chapter on the issues of time and place of formation of contracts. The conclusions of that study are that the reception rule should be promoted as particularly suitable for EDI. The TEDIS Study on the Formation of Contracts also mentions that the reception rule is in line with article 18(2) of the United Nations Sales Convention and with national legislation in a number of European States.

3. General conditions

77. It may be recalled that the main problem regarding general conditions in a contract is to know to what extent they can be asserted against the other contracting party (see A/CN.9/333, paras. 65 to 68). In many countries, the courts will consider whether it can reasonably be inferred from the context that the party against whom general conditions are asserted has had an opportunity to be informed of their contents or whether it can be assumed that the party has expressly or implicitly agreed not to oppose all or part of their application.

26/ The final draft of the TEDIS agreement is reproduced in TRADE/WP.4/R/784.

78. EDI is not equipped, or even intended, to transmit all the legal terms of the general conditions that are printed on the back of purchase orders, acknowledgements and other paper documents traditionally used by trading partners. A solution to that difficulty is to incorporate the general conditions in the communication agreement concluded between the trading partners. An example of such a provision is contained in A/CN.9/350, para. 96. However, some model agreements have expressly excluded coverage of general conditions, based on the principle expressed in article 1 of the UNCID Rules (see Annex) that the interchange agreement should relate only to the interchange of data, and not to the substance of the transfer, which might involve consideration of various underlying commercial or contractual obligations of the parties. 27/ In that case, general conditions may be covered by a master agreement distinct from the communication agreement, for example a master supply agreement for the sale of goods.

F. Communication

79. The legal issues of communication have been addressed in the UNCID Rules (see above, paras. 23-24) and in most communication agreements or user manuals prepared for potential EDI users.

1. Use of functional acknowledgements

80. Several of the rules and model communication agreements recently developed include special provisions encouraging systematic use of "functional acknowledgements" and verification procedures. A functional acknowledgement is a device by which the sender of a message can be almost immediately notified that the message was received, and received without defects such as omissions or errors in format or syntax. Acknowledgement of receipt merely confirms that the original message is in the possession of the receiving party and is not to be confused with any decision on the part of the receiving party as to agreement with the content of the message. Nevertheless, an acknowledgement of receipt helps to eliminate a number of problems regarding ambiguities or misunderstandings, as well as errors in the communication process.

81. Communication agreements often differ concerning the characteristics of the functional acknowledgement they require. Furthermore, they differ concerning the consequences they attach to the sending of an acknowledgement or to the failure to acknowledge. 28/

2. Liability for failure or error in communication

82. A question that is not directly related to the formation of contracts but that needs to be addressed within the contractual framework of an EDI relationship is the determination of which party is to bear the risk of a failure in communication of an offer, acceptance or other communication

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27/ For an example of an interchange agreement excluding coverage of the general conditions, see the "[United Kingdom] EDI Association standard electronic data interchange agreement", explanatory commentary, August 1990.

28/ See A.H. Boss, "The proliferation of 'Model' interchange agreements", text of a presentation made at the Third International Congress of EDI users.

intended to have legal effect, such as an instruction to release goods to a third party. It may be noted that model agreements generally address cases both of failure to communicate and of error in communication under the same provision. Some agreements impose an obligation on the sender to assure the completeness or accuracy of the data transmitted. Other agreements impose on the recipient of the message the obligation to notify the sender if a message is unintelligible or garbled. Examples of such provisions are contained in A/CN.9/350, paras. 102-103. 29/

83. Where parties to an EDI relationship communicate through a third-party service provider such as a value-added network, the contractual arrangements between the parties cannot bind the third party. Parties can only agree on the allocation of risks in the event of non-feasance or malfeasance by the service provider. Within a contractual framework, the rules applicable to the liability of the network operator might be limited to the rules agreed upon by the operator itself and included in the service contract concluded between the operator and its customers. Further difficulties might arise in the situation where a given communication would involve more than one network. In general, reliance on contractual arrangements regarding liability issues might result in an unbalanced situation. Although liability is probably provided for by general provisions of law, the Working Group may wish to consider that there exists a need for the preparation of specific statutory rules on the liability of parties to an EDI relationship.

G. Documents of title and securities

84. A general question concerning documents of title in an EDI environment is whether negotiability and other characteristics of documents of title can be accommodated in an electronic context. A subsidiary question is whether the issues of documents of title in an electronic context can be addressed within the framework of a contractual arrangement or whether statutory law is needed. In that connection, it may be recalled that the legal regime of documents of title must take into account the fact that title and other proprietary rights may have to be transferred for security purposes and that such rights and security interests need to be regulated with regard to the legal position of creditors and other third parties.

85. The specific issues of the negotiable bill of lading are addressed in the "CMI Rules for Electronic Bill of Lading" adopted by the International Maritime Committee (CMI) in 1990. The CMI Rules envisage a system administered by the carrier, which preserves the function of negotiability in the electronic bill of lading through the use of a secret code ("private key"). Discussions are also taking place within WP. 4 with a view to defining some form of an "electronic bill of lading".

86. It may be noted that, prior to the CMI Rules, a private project known as the "Seadocs" system had attempted to achieve the electronic transfer of rights traditionnally effected by transmission of a paper bill of lading. The project was intended to accommodate the particular needs of bulk cargo shipping, especially oil. This operated by creating a central authority,

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29/ For other examples, see A.H. Boss (above, note 28).